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"Antibody titers against SARS-CoV-2 Omicron variant B.1.1.529 and subvariant BA.2 following vaccination"

BACKGROUND: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) Omicron variant B.1.1.529 and subvariant BA.2 were first detected in late 2021. The Omicron variant quickly became the most widespread in the United States due to its increased transmissibility compared to previous SARS-CoV-2 variants. The BA.2 sub-lineage has been shown to be particularly communicable and was the most prevalent strain in the United States as of March 2022. It is unknown if this increased infectivity of BA.2 is due to depressed antibody quantities following vaccination against wild-type virus or previous infection with other strains of SARS-CoV-2. The goal of this study is to determine antibody titers against the receptor binding domain (RBD) of strains B.1.1.529 and BA.2 following vaccination and/or infection with the virus and compare this data to that of the wild-type strain.

METHODS: Subjects were enrolled in a natural history study of the immune response to COVID-19 infection. Informed consent was obtained, and 10 ml of blood was collected and tested for antibodies against COVID-19 proteins. Subjects were followed at 6-month intervals or after vaccination. RBD antigen for either the B.1.1.529 and BA.2 strain were coated on 96 well Immulon-2 plates overnight at 4°C. The plates were washed with PBS, blocked, 2-fold dilutions of serum were added to the antigen coated plates and incubated at room temperature for 2 hours. The plates were washed and then coated with goat anti-human IgG linked to alkaline phosphatase for another 2 hours, developed, and read at 405nm absorbance. End-point dilution titers were determined and compared between wild type (WT, previously done), B.1.1.529 and BA.2 strains.

RESULTS: A subset of 23 subjects were more closely examined after initial vaccination and follow-up boosting (2^{nd} dose) comprising a total of 60 samples. The overall rate of seropositivity was 91.3%, 69.0%, and 74.1% for the WT, B.1.1.529, and BA.2 strains respectively. In the pre-vaccine samples, the WT titers were significantly higher compared to titers against the other 2 strains ($p<0.0001$, $p=0.0003$), which were not significantly different from each other ($p=0.892$). In the samples collected after initial vaccination, there was no significant difference in titer levels against all three strains ($p=0.494$). WT titers were meaningfully higher compared to both the B.1.1.529 and BA.2 ($p=0.0013$, $p=0.0101$) titers in the samples collected after patients received a booster, and titers against the latter two strains were similar ($p=0.760$).

DISCUSSION: The observed seropositivity against RBD antigens of various COVID-19 strains can be attributed to the high rate of vaccination and/or previous infection amongst the study cohort. The overall higher titer levels against the WT strain compared to the other two strains are likely due to COVID-19 vaccines being designed against WT RBD. But a significant rise in antibody titer occurred against the B.1.1.529 and BA.2 strains after vaccination against wild type COVID-19. Hopefully this correlates to at least partial protection from Omicron strains for those who are vaccinated.